

# Mid-resolution satellite contributions to GEOSS societal benefit areas: examples from the ASTER global mapping mission

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## GEO, GEOSS, and NASA

The Group on Earth Observations (GEO) came into being through initiatives at the 2002 World Summit on Sustainable Development and by the Group of Eight leading industrial nations, with a goal of enabling international cooperation in order to maximize satellite mission efficiencies and the value derived from Earth observations.

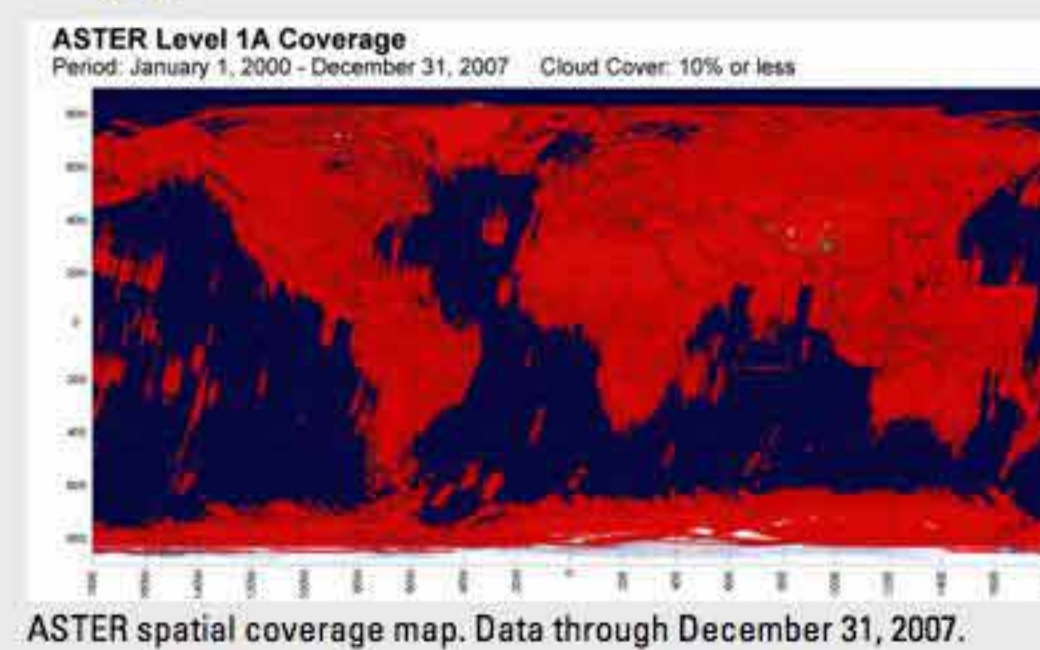
The Global Earth Observation System of Systems (GEOSS) is now being constructed by GEO based on an implementation plan that identifies nine societal benefit areas. These include disasters, health, energy, climate, water, weather, ecosystems, agriculture, and biodiversity. Comprehensive and sustained Earth observations advance the understanding of Earth's integrated systems, and contribute to achieving the objectives of the United Nations Millennium Declaration and the World Summit on Sustainable Development.

The critical importance of current and future satellite observations for Earth investigations has been stressed by many leading organizations. In the United States, the National Research Council of the National Academies considered integrated strategies and enumerated essential requirements. The National Aeronautics and Space Administration (NASA) has provided leadership in the development of key systems. Many focus areas of the NASA Science Mission Directorate's Science Plan overlap the nine GEOSS societal benefit areas.

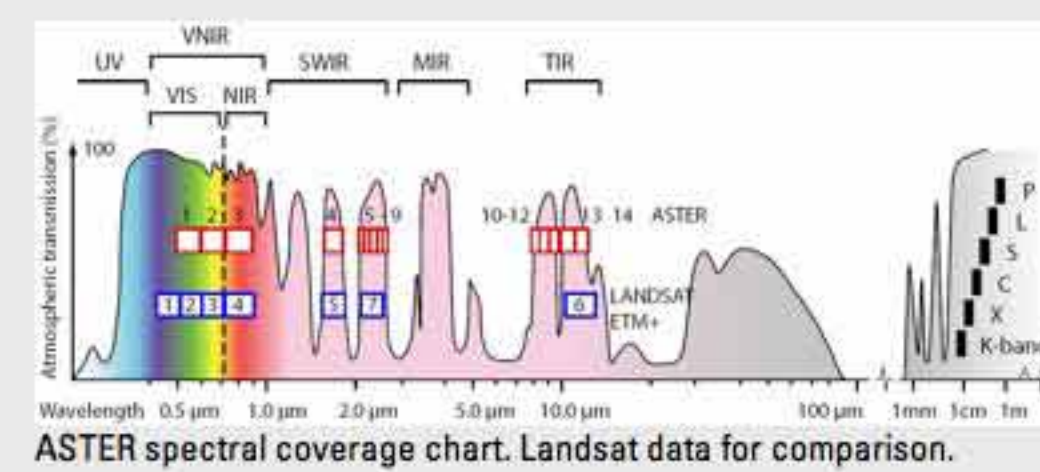
With the Earth Observing System (EOS), NASA launched a series of satellites in order to obtain science data for use in Earth climate studies. The EOS Terra spacecraft was launched in 1999 to begin obtaining a multi-year data record using several onboard sensors, one of which is the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER). ASTER acquires daily multispectral images of the Earth, and these data represent excellent examples of how mid-resolution satellite observations provide direct benefits to society in the areas outlined by GEOSS. Representative scenes are shown at right for all GEOSS benefit areas.

## ASTER Global Mapping Mission

The ASTER instrument on the Terra spacecraft is a joint international effort involving collaboration between NASA and Japan's Ministry of Economy, Trade and Industry (METI), plus scientific and industry organizations in the United States and Japan. Launched in 1999, ASTER is very successfully completing a global mapping mission, with nearly 1.5 million scenes archived in both the U.S. and Japan.

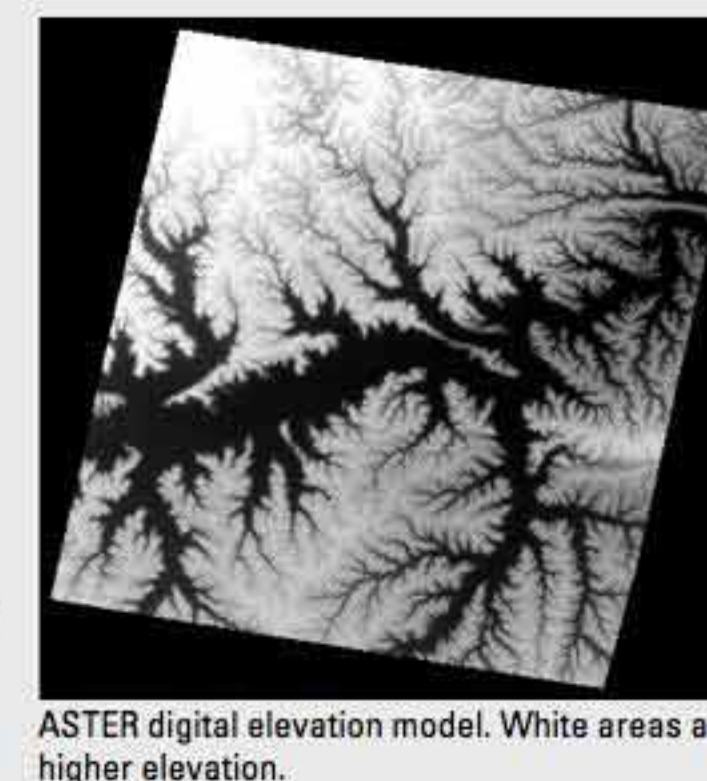


ASTER acquires 15-m, 30-m, and 90-m multispectral data in 14 bands in the visible and near-infrared, shortwave infrared, and thermal wavelengths, respectively. A stereo viewing capability enables the creation of digital elevation models (DEM).



## ASTER Global DEM

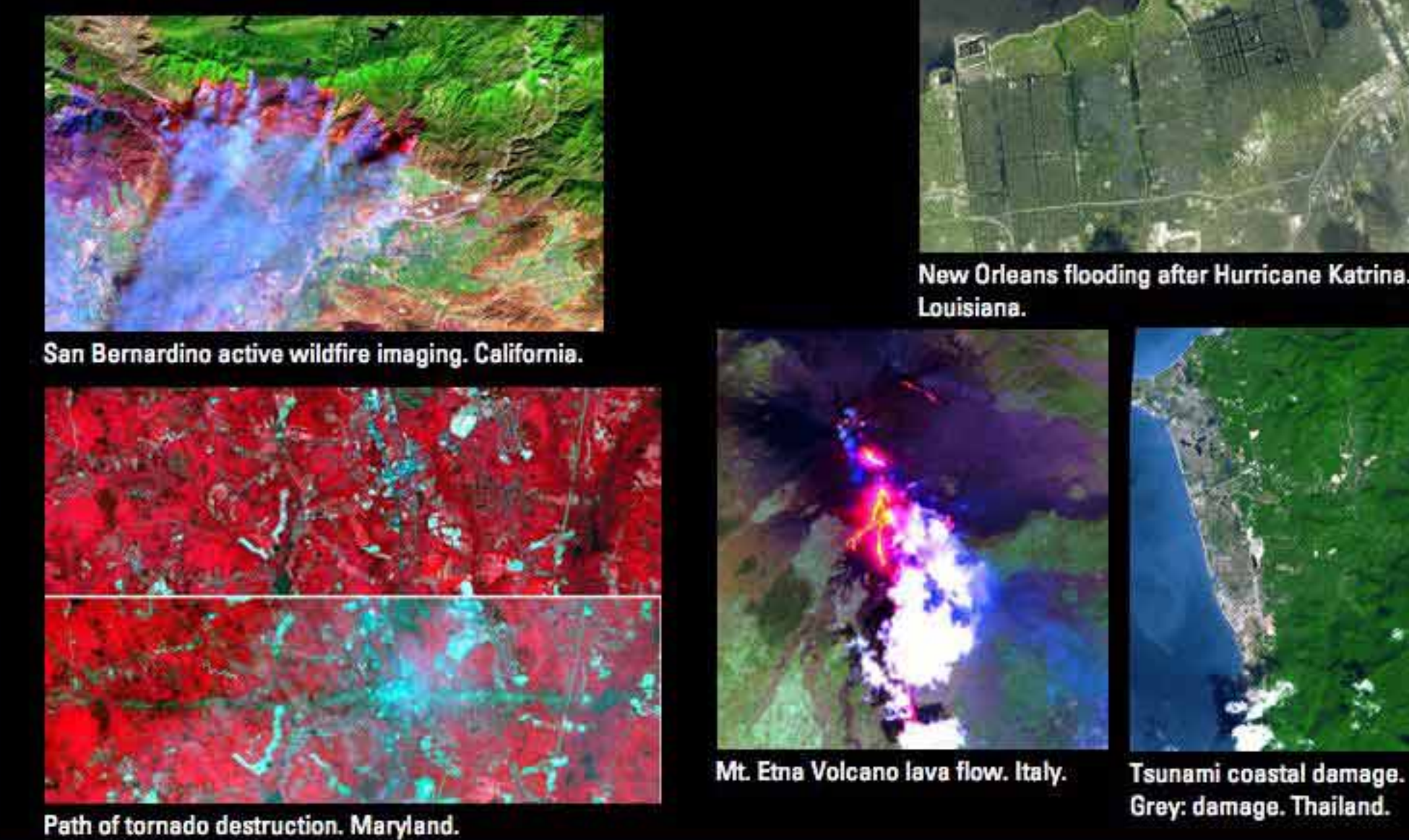
NASA, METI, and the United States Geological Survey (USGS) partnered to enable the generation of a 30-m global ASTER digital elevation model consisting of 22,600 1° by 1° tiles from 83° N to 83° S. Product release is anticipated in 2009. Data will be contributed to GEOSS, and distributed by the Land Processes Distributed Active Archive Center in the United States and by the Earth Remote Sensing Data Analysis Center in Japan.



**ASTER Data Sources**  
Land Processes Distributed Active Archive Center (<http://LPDAAC.usgs.gov>) and Earth Remote Sensing Data Analysis Center ([http://www.gds.aster.ersdac.or.jp/gds\\_vvww2002/index\\_e.html](http://www.gds.aster.ersdac.or.jp/gds_vvww2002/index_e.html)). ASTER images courtesy of NASA, Goddard Space Flight Center (GSFC), METI, Earth Remote Sensing Data Analysis Center (ERSDAC), Japan Resource Observation System (JAROS), and U.S./Japan ASTER Science Team.

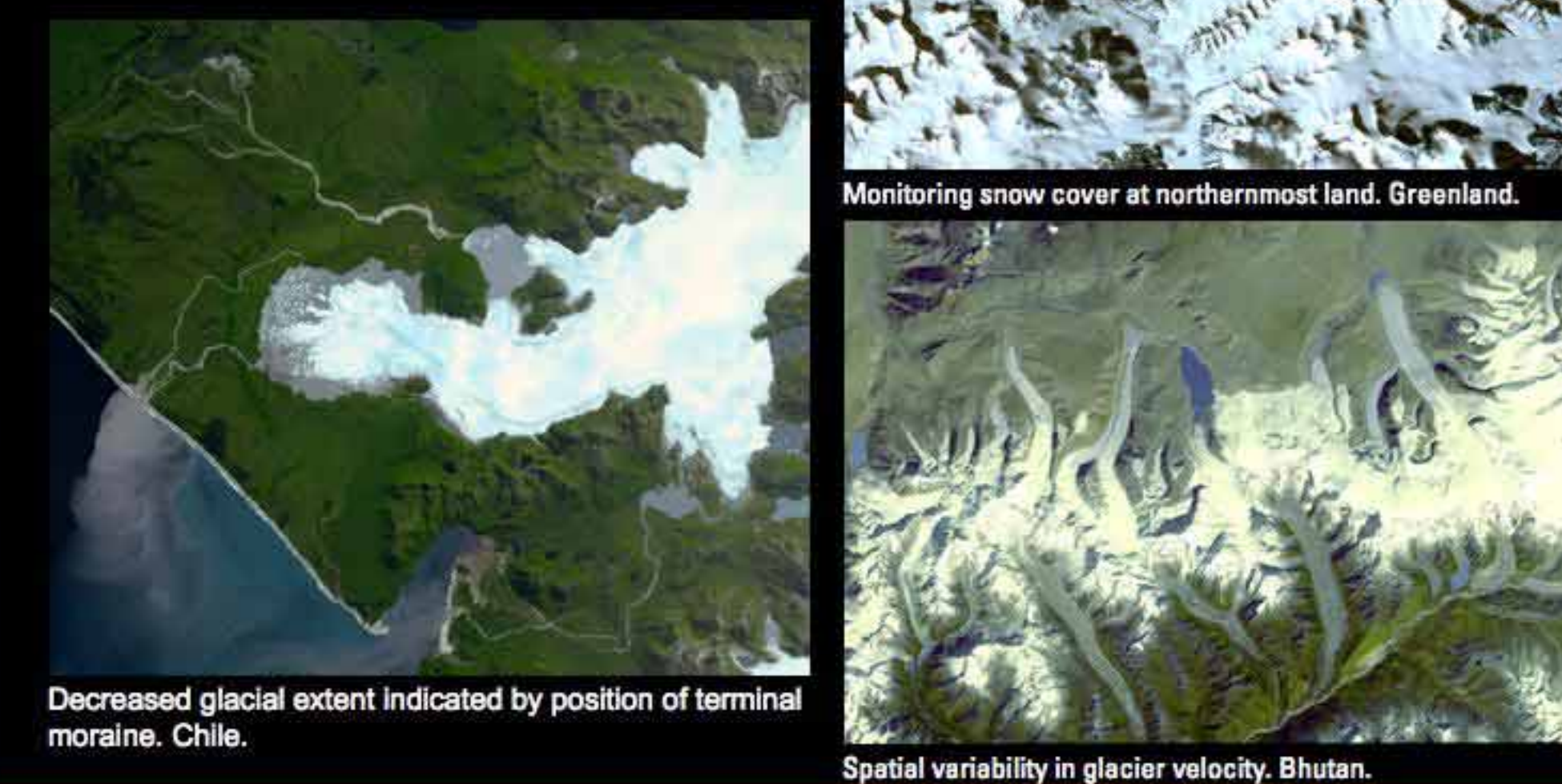
## Disasters

Potential applications: event monitoring, images for emergency responders, risk assessment, change detection.



## Climate

Potential applications: provide data for use in improving the ability to model variability and minimize adverse impacts.



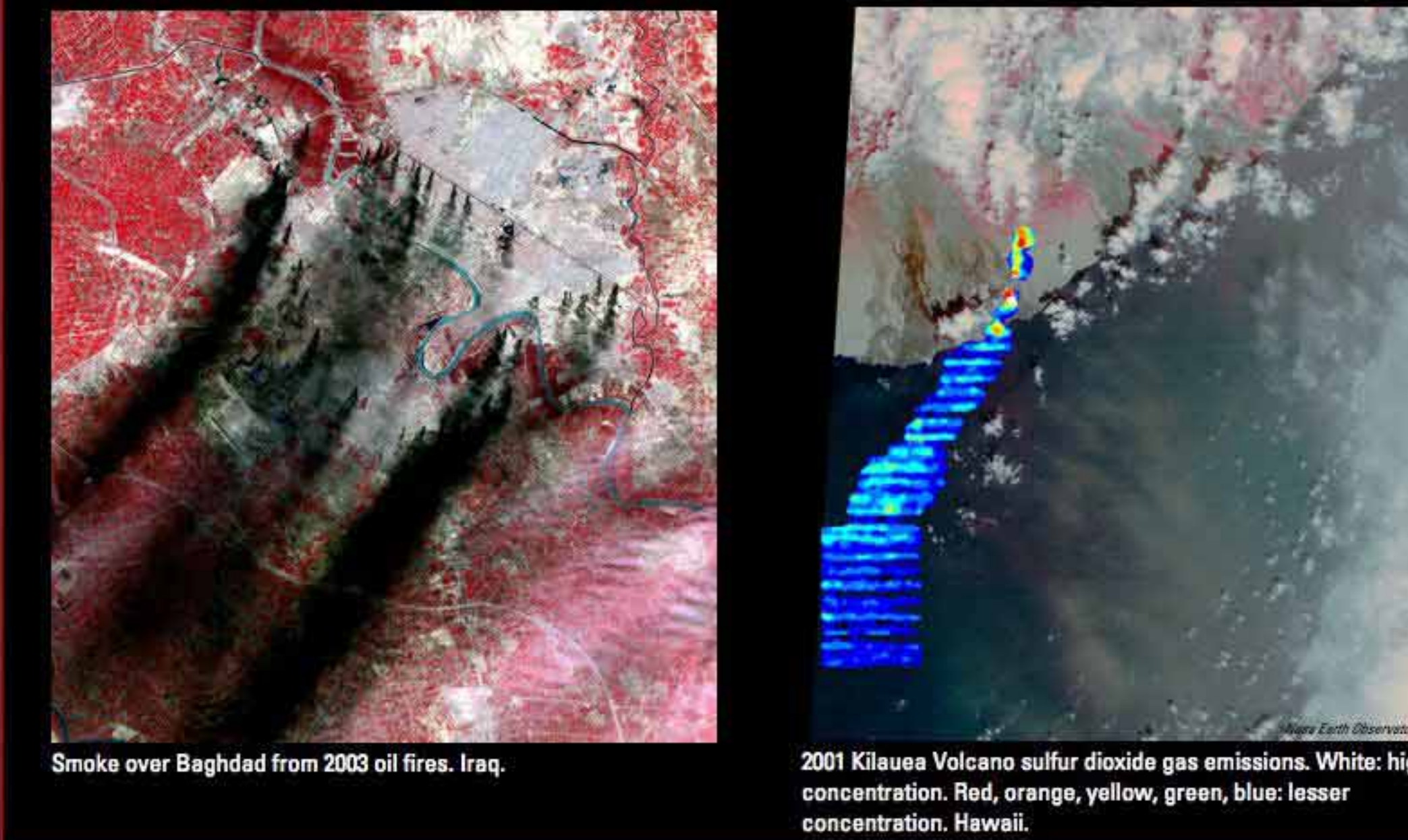
## Ecosystems

Potential applications: determine areal extents and condition, provide continuity of observations for change detection.



## Health

Potential applications: pollution detection, insight on weather-related disease vectors through land-cover assessments.



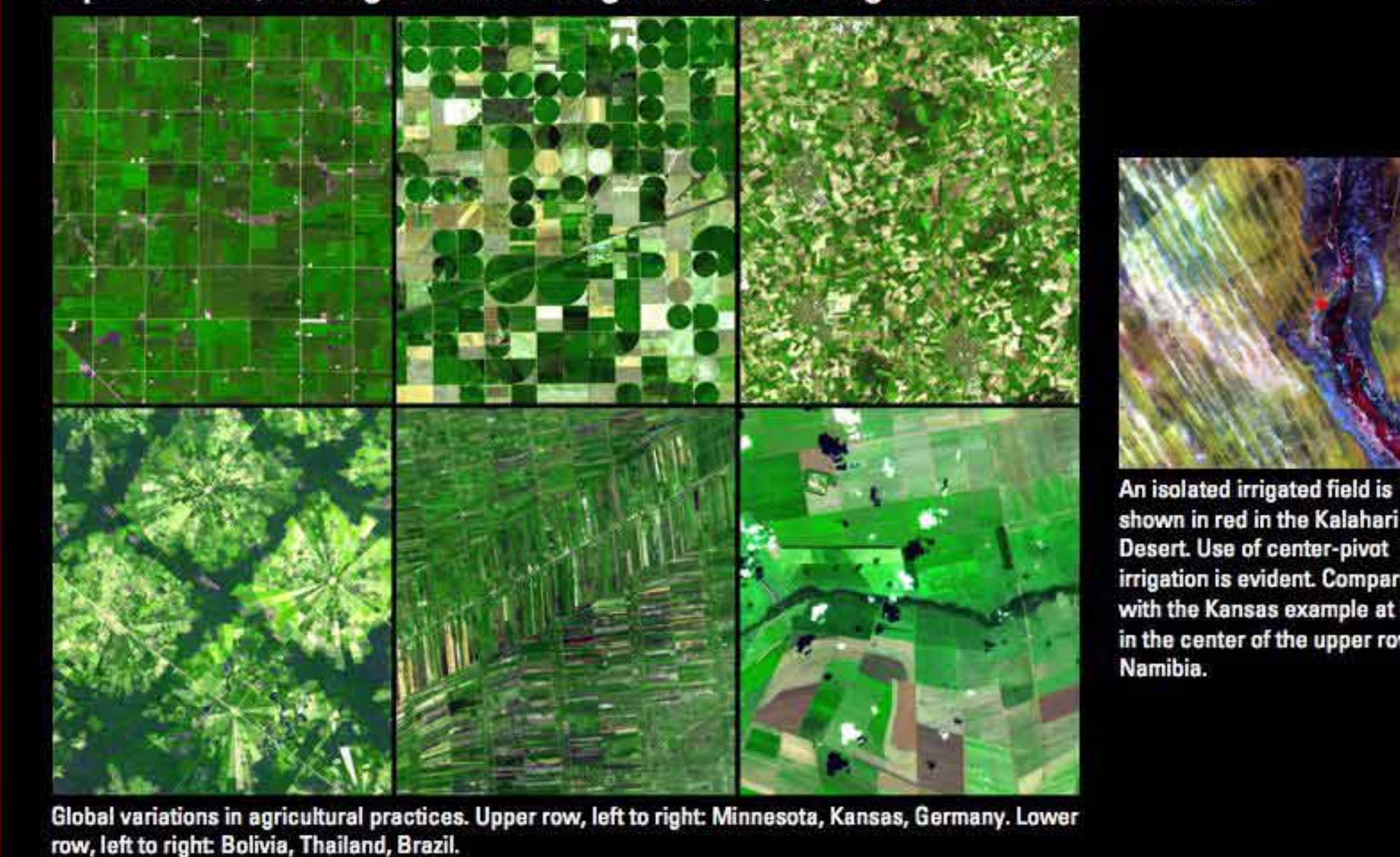
## Water

Potential applications: detect changes in extent and quality of water bodies, improve water resource management, increase understanding of water cycle.



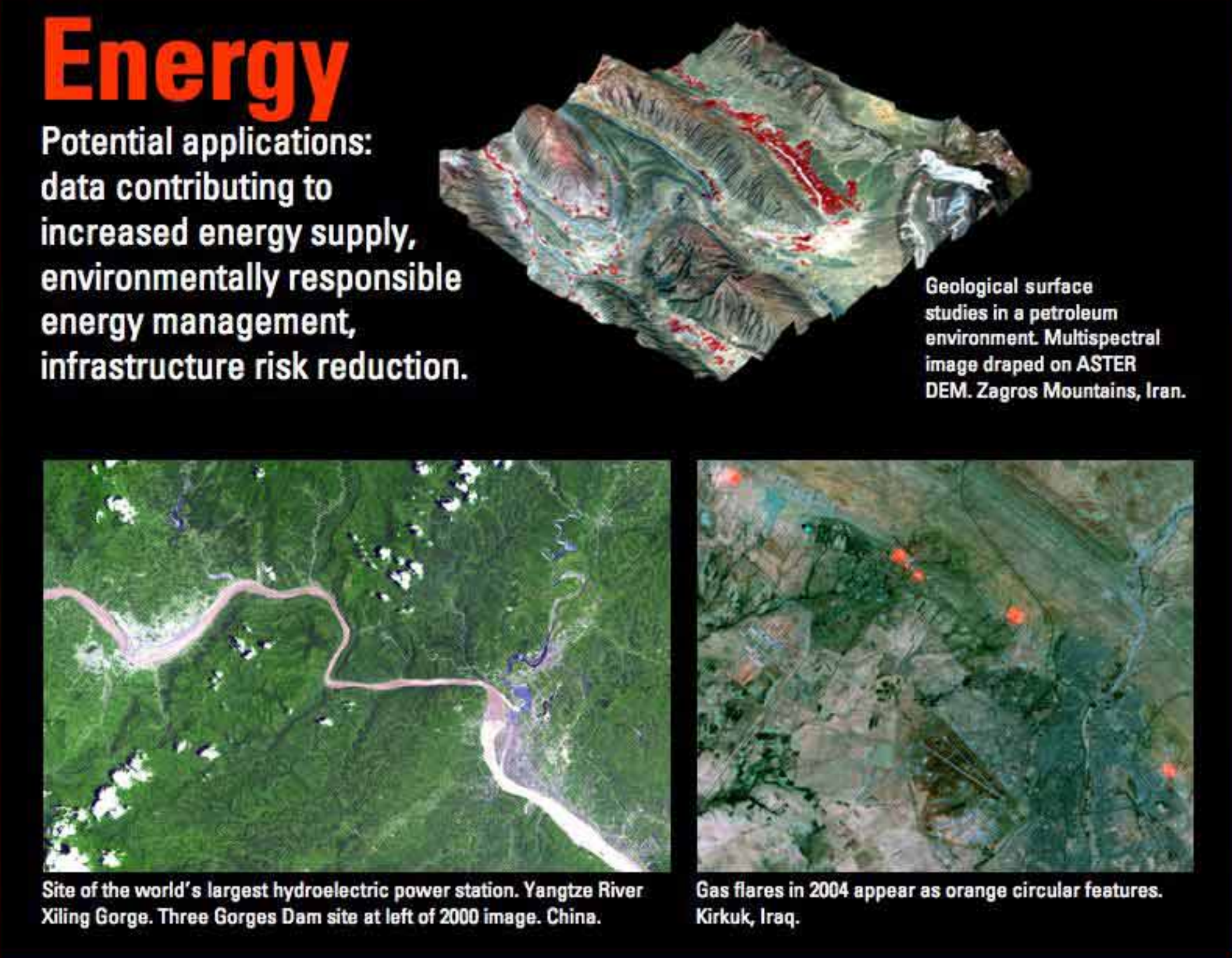
## Agriculture

Potential applications: crop production, land use and land cover change, aquaculture, changes in land degradation, drought and desertification.



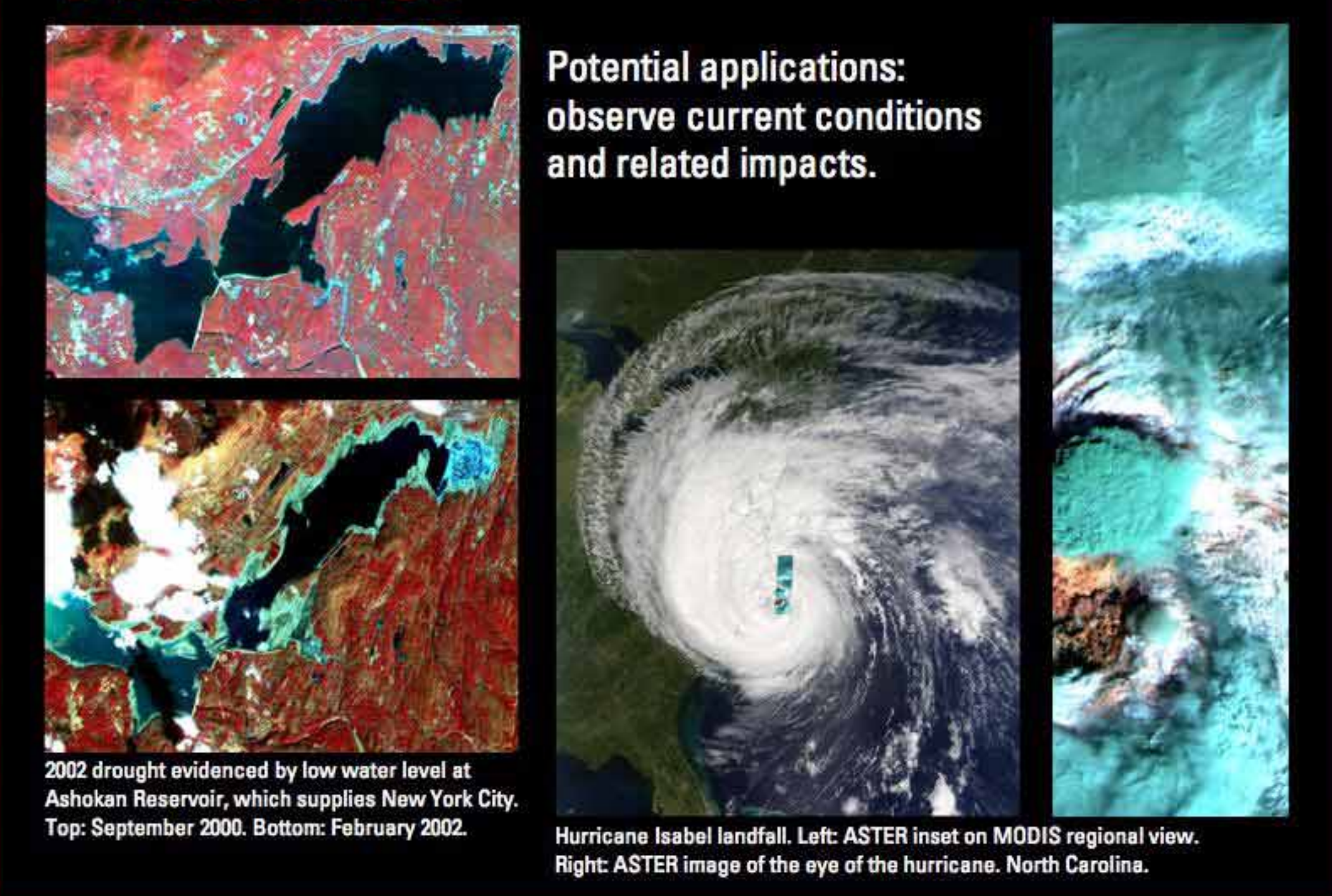
## Energy

Potential applications: data contributing to increased energy supply, environmentally responsible energy management, infrastructure risk reduction.



## Weather

Potential applications: observe current conditions and related impacts.



## Biodiversity

Potential applications: provide information concerning the condition and extent of ecosystems, as an indicator of species distribution.

